Hi Prasanjeet,

It was great speaking with you! As per our conversation, here's the next step in our hiring process. Below are two programming problems. Please read the two descriptions thoroughly then create a program to solve ONE of the problems. If you submit more than one solution, we will review only one.

Note:

* For the solution, we request that you use Java, Ruby, C#, Python, Clojure, Scala or JavaScript.
* There must be a way to supply the application with the input data via text file
* The application must run
* You should provide sufficient evidence that your solution is complete by indicating that it works correctly against the supplied test data
* Please use the URL at the bottom of this email to submit your code.

**Rules:**

1. You may not use any external libraries to solve this problem, but you may use external libraries or tools for building or testing purposes. Specifically, you may use unit-testing libraries or build tools available for your chosen language (e.g., JUnit, Ant, NUnit, Rspec, Rake, etc.).
2. System security is very important to us and certain file extensions will be blocked for security purposes, resulting in delays to your application. You should NOT include any executable attachments, including those with .exe or .lib extensions. We need to be able to run and build your code ourselves, so please submit your code as a zipped file of source code and supporting files, without any compiled code. If you're submitting in C#, please do not submit your code as a .msi file.
3. Please include a brief explanation of your design and assumptions, along with your code, as well as detailed instructions to run your application.
4. We assess a number of things including the design aspect of your solution and your object oriented programming skills. While these are small problems, we expect you to submit what you believe is production-quality code; code that you’d be able to run, maintain, and evolve. You don’t need to gold plate your solution, however we are looking for something more than a bare-bones algorithm.
5. We want our hiring process to be fair, and for everyone to start from the same place. To enable this, we request that you do not share or publish these problems.
6. Please compress your files into a single .zip file before upload. Kindly ensure there are no executables in your submission. Our system blocks executable files for security purposes, and we want to avoid any delays in your process.
7. Please use the URL at the bottom of this email to submit your code.
8. \*\*Executables include asp, bat, class, cmd, com, cpl, dll, exe, fon, hta, ini, ins, iw, jar, jsp, js, jse, pif, scr, shs, sh, vb, vbe, vbs, ws, wsc, wsf, wsh & msi

**As a general rule, we allow three days from the date that you receive these instructions to submit your code, but you may request more time from your recruiter if needed. If you have any questions about the code as it relates to your interview process, please contact your recruiter**

**Problem One: Merchant's Guide to the Galaxy**

You decided to give up on earth after the latest financial collapse left 99.99% of the earth's population with 0.01% of the wealth. Luckily, with the scant sum of money that is left in your account, you are able to afford to rent a spaceship, leave earth, and fly all over the galaxy to sell common metals and dirt (which apparently is worth a lot).

Buying and selling over the galaxy requires you to convert numbers and units, and you decided to write a program to help you.

The numbers used for intergalactic transactions follows similar convention to the roman numerals and you have painstakingly collected the appropriate translation between them.

Roman numerals are based on seven symbols:

|  |  |
| --- | --- |
| *Symbol* | *Value* |
| *I* | *1* |
| *V* | *5* |
| *X* | *10* |
| *L* | *50* |
| *C* | *100* |
| *D* | *500* |
| *M* | *1,000* |

Numbers are formed by combining symbols together and adding the values. For example, MMVI is 1000 + 1000 + 5 + 1 = 2006. Generally, symbols are placed in order of value, starting with the largest values. When smaller values precede larger values, the smaller values are subtracted from the larger values, and the result is added to the total. For example MCMXLIV = 1000 + (1000 − 100) + (50 − 10) + (5 − 1) = 1944.

* The symbols "I", "X", "C", and "M" can be repeated three times in succession, but no more. (They may appear four times if the third and fourth are separated by a smaller value, such as XXXIX.) "D", "L", and "V" can never be repeated.
* "I" can be subtracted from "V" and "X" only. "X" can be subtracted from "L" and "C" only. "C" can be subtracted from "D" and "M" only. "V", "L", and "D" can never be subtracted.
* Only one small-value symbol may be subtracted from any large-value symbol.
* A number written in [16]Arabic numerals can be broken into digits. For example, 1903 is composed of 1, 9, 0, and 3. To write the Roman numeral, each of the non-zero digits should be treated separately. Inthe above example, 1,000 = M, 900 = CM, and 3 = III. Therefore, 1903 = MCMIII.

(Source: Wikipedia ( [17]<http://en.wikipedia.org/wiki/Roman_numerals>)

Input to your program consists of lines of text detailing your notes on the conversion between intergalactic units and roman numerals.

You are expected to handle invalid queries appropriately.

***Test input:***

glob is I

prok is V

pish is X

tegj is L

glob glob Silver is 34 Credits

glob prok Gold is 57800 Credits

pish pish Iron is 3910 Credits

how much is pish tegj glob glob ?

how many Credits is glob prok Silver ?

how many Credits is glob prok Gold ?

how many Credits is glob prok Iron ?

how much wood could a woodchuck chuck if a woodchuck could chuck wood ?

***Test Output:***

pish tegj glob glob is 42

glob prok Silver is 68 Credits

glob prok Gold is 57800 Credits

glob prok Iron is 782 Credits

I have no idea what you are talking about

**Problem Two: Conference Track Management**

You are planning a big programming conference and have received many proposals which have passed the initial screen process but you're having trouble fitting them into the time constraints of the day -- there are so many possibilities! So you write a program to do it for you.

* The conference has multiple tracks each of which has a morning and afternoon session.
* Each session contains multiple talks.
* Morning sessions begin at 9am and must finish by 12 noon, for lunch.
* Afternoon sessions begin at 1pm and must finish in time for the networking event.
* The networking event can start no earlier than 4:00 and no later than 5:00.
* No talk title has numbers in it.
* All talk lengths are either in minutes (not hours) or lightning (5 minutes).
* Presenters will be very punctual; there needs to be no gap between sessions.

Note that depending on how you choose to complete this problem, your solution may give a different ordering or combination of talks into tracks. This is acceptable; you don’t need to exactly duplicate the sample output given here.

***Test input:***

Writing Fast Tests Against Enterprise Rails 60min

Overdoing it in Python 45min

Lua for the Masses 30min

Ruby Errors from Mismatched Gem Versions 45min

Common Ruby Errors 45min

Rails for Python Developers lightning

Communicating Over Distance 60min

Accounting-Driven Development 45min

Woah 30min

Sit Down and Write 30min

Pair Programming vs Noise 45min

Rails Magic 60min

Ruby on Rails: Why We Should Move On 60min

Clojure Ate Scala (on my project) 45min

Programming in the Boondocks of Seattle 30min

Ruby vs. Clojure for Back-End Development 30min

Ruby on Rails Legacy App Maintenance 60min

A World Without HackerNews 30min

User Interface CSS in Rails Apps 30min

***Test output:***

Track 1:

09:00AM Writing Fast Tests Against Enterprise Rails 60min

10:00AM Overdoing it in Python 45min

10:45AM Lua for the Masses 30min

11:15AM Ruby Errors from Mismatched Gem Versions 45min

12:00PM Lunch

01:00PM Ruby on Rails: Why We Should Move On 60min

02:00PM Common Ruby Errors 45min

02:45PM Pair Programming vs Noise 45min

03:30PM Programming in the Boondocks of Seattle 30min

04:00PM Ruby vs. Clojure for Back-End Development 30min

04:30PM User Interface CSS in Rails Apps 30min

05:00PM Networking Event

***Track 2:***

09:00AM Communicating Over Distance 60min

10:00AM Rails Magic 60min

11:00AM Woah 30min

11:30AM Sit Down and Write 30min

12:00PM Lunch

01:00PM Accounting-Driven Development 45min

01:45PM Clojure Ate Scala (on my project) 45min

02:30PM A World Without HackerNews 30min

03:00PM Ruby on Rails Legacy App Maintenance 60min

04:00PM Rails for Python Developers lightning

05:00PM Networking Event

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\*\*\*\* Some recommendations for better coding practices \*\*\*

1. <http://shirishpadalkar.wordpress.com/2014/05/30/recommended-reading-developers-interview-at-thoughtworks/>
2. [http://priyaaank.tumblr.com/post/95095165285/decoding-thoughtworks-coding-problems](http://jobs.thoughtworks.com/mailRedir.php?u=69230&code=EKTpQKAPOEXtvnXDZPJxfysQprQ6mnIU&link=330&transformedUrl=8e867c337409d7ee16b24c4780caef32)
3. [http://vampwillow.wordpress.com/2014/07/22/hacking-thoughtworks-recruitment-part-2-coding-problems/](http://jobs.thoughtworks.com/mailRedir.php?u=69230&code=EKTpQKAPOEXtvnXDZPJxfysQprQ6mnIU&link=468&transformedUrl=86477ae5fde9ddb9e05f8af19a4c845d)

Just to re-iterate, things we look for in code

1. clear and good object modelling

2. clear and logical separation of responsibilities - (emphasis on single responsibility)

3. things not dumped in at one place

4. Unit tests

5. easy to understand , not to complex code (something which can be extended by any other person) and ofcourse functional completion.

Regards

Joshua

Recruiter - ThoughtWorks Pune

[TW India opportunities LinkedIn](https://www.linkedin.com/groups/8292518/members/pending?trk=hb_ntf_GROUP_REQUESTED_TO_JOIN) : Mobile: +91 9545634565  || Email : [ijoshua@thoughtworks.com](mailto:ijoshua@thoughtworks.com)

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Please submit here: <http://app.greenhouse.io/tests/728796e3bd68987e58dff1e81af3840a>